Name ______________________ Date __________________ Class____________________________

The Body's Defenses

Nonspecific Defenses

Directions: *Read the passage below. Answer the questions that follow.*

When the body is invaded, four important nonspecific defenses take action: the inflammatory response; the temperature response; proteins that kill or inhibit pathogens; and white blood cells, which attack and kill pathogens.

Inflammatory Response: Injury or local infection, such as a cut or a scrape, causes an inflammatory response. An inflammatory response is a series of events that suppress infection and speed recovery. Imagine that a splinter has punctured your finger, creating an entrance for pathogens. Infected or injured cells in your finger release chemicals, including histamine. Histamine causes local blood vessels to dilate, increasing blood flow to the area. Increased blood flow brings white blood cells to the infection site, where they can attack pathogens. The increased blood flow also causes swelling and redness in the infected area. The whitish liquid, or pus, associated with some infections contains white blood cells, dead cells and dead pathogens.

Temperature Response: When the body begins its fight against pathogens, body temperature increases several degrees above the normal value of about 37^{o}C (99^{o}F). This higher temperature is called a fever, and it is a common symptom of illness that shows the body is responding to an infection. Fever is helpful because many disease-causing bacteria do not grow well at high temperatures.

Directions: *Read each question and write your answer in the space provided.*

1. What four nonspecific defenses are caused by pathogens invading the body?

2. What is an inflammatory response?

Immune Response

Directions: *Read the passage below. Answer the questions that follow.*

White blood cells are produced in bone marrow and circulate in blood and lymph. Of the 100 trillion cells in your body, about 2 trillion are white blood cells. Four main kinds of white blood cells participate in the immune response: macrophages, cytotoxic T cells, B cells and helper T cells. Each kind of cell has a different function. Macrophages consume pathogens and infected cells. Cytotoxic T cells attack and kill infected cells. B cells label invaders for later destruction by macrophages. Helper T cells activate both cytotoxic T cells and B cells. These four kinds of white blood cells interact to remove pathogens from the body.

1. ***Write the type of white blood cell described by the phrase.***

   a. ____________________ label invaders for later destruction

   b. ____________________ consume pathogens

   c. ____________________ kill infected cells

   d. ____________________ activate B cells

   e. ____________________ consume infected cells

   f. ____________________ activate cytotoxic T cells

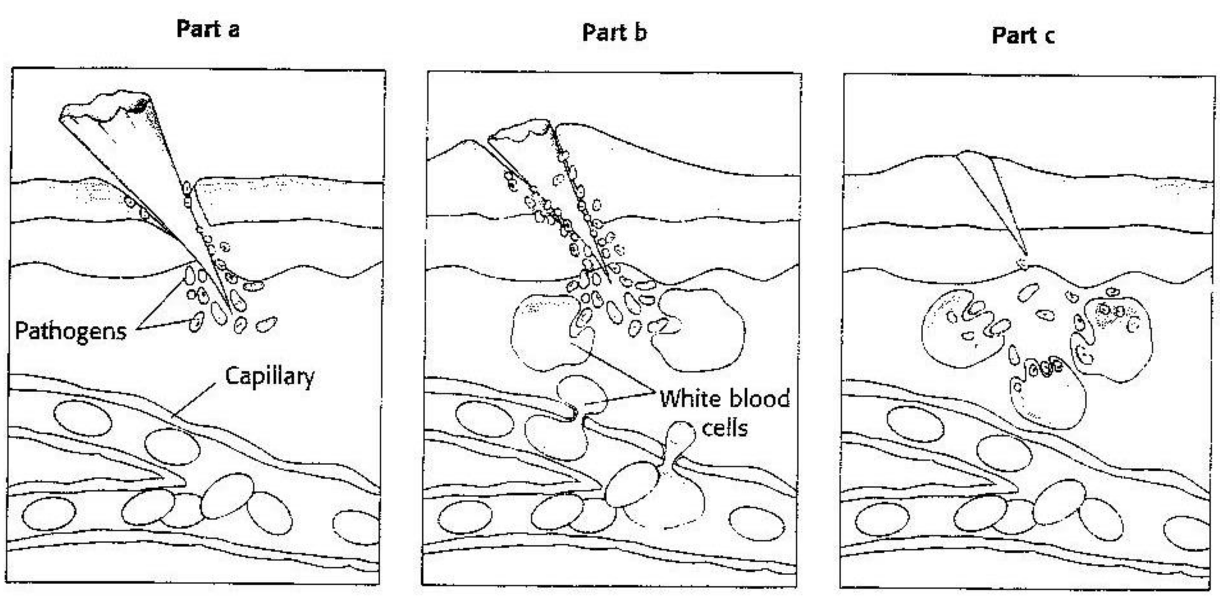
2. A ration of white blood cells to body cells shows one white blood cell to

   a. 10 body cells.
   b. 50 body cells.
   c. 1,000 body cells.
   d. 5,000,000 body cells.

3. What three effects does increased blood flow have on an infection site?

4. What effect does fever have on many disease-causing bacteria?

5. The figure illustrates the inflammatory response. In the space on the next page describe what is occurring in each part of the figure.



Part a:

Part b:

Part c:

6. Release of the chemical histamine causes

a. the production of white blood cells.
b. a decrease in blood flow.
c. A decrease in body temperature.
d. blood vessels to dilate.

Disease Transmission and Prevention

Directions: *Read the passage below. Answer the questions that follow.*

The German physician Robert Koch (1843-1910) established a procedure for diagnosing causes of infection. In his research with anthrax, Koch developed the following four-step procedure, known as Koch's postulates, as a guide for identifying specific pathogens. Biologists have used Koch's postulates to identify many pathogens

1. The pathogen must be found in an animal with the disease and not in a healthy animal.
2. The pathogen must be isolated from the sick animal and grown in a laboratory culture.
3. When the isolated pathogen is injected into a healthy animal, the animal must develop the disease.
4. The pathogen should be taken from the second animal and grown in laboratory culture. The pathogen should be the same as the original pathogen.

1. What is indicated when, in spite of being injected with a pathogen isolated from a sick animal, another animal remains healthy?

2. According to Koch's postulates, a pathogen can be considered to cause a particular disease if the pathogen is

a. found in an animal with the disease.
b. lacking in healthy animals.
c. found in all members of the same species.
d. Both (a) and (b).

Disorders of the Immune System

Directions: *Read the passage below. Answer the questions that follow.*

You can become infected with HIV if you receive HIV-infected white blood cells, which are present in many body fluids. The most common method of HIV transmission is through sexual contact. Because semen, vaginal fluid and mucous membranes may contain HIV, both males and females can become infected with HIV during vaginal, anal or oral intercourse. Use of a latex condom during intercourse reduces but does not eliminate the risk of getting or spreading HIV.

HIV can be passed between drug users who share a hypodermic needle if HIV-infected blood remains in the needle or syringe. In the late 1970s and early 1980s, many people became infected with HIV after receiving transfusions of HIV-contaminated blood. This is very unlikely now because blood made available for transfusion is tested for HIV. In addition, pregnant or nursing mothers can pass HIV to their infants through breast milk and blood.

HIV is not transmitted through the air, by toilet seats, by kissing or handshaking, or by any other medium where HIV-infected white blood cells could not survive. Although HIV has been found in tears, saliva and urine, these body fluids usually contain too few HIV particles to cause an infection. Insects such as mosquitoes and ticks do not transmit HIV because they do no carry infected white blood cells.

1. What is the most common method of HIV transmission?